Original Study

PREVALENCE OF PONTICULUS POSTICUS IN KASHMIRI POPULATION

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ABSTRACT

Aims & Objective: To investigate the prevalence and morphological features of Ponticulus Posticus (PP) in population of Kashmir division of Jammu & Kashmir State, India.

Materials & Method: 1000 patients were investigated with digital lateral cephalograms for the Presence and type of ponticulus posticus.

Results: Among the sample of 1000 cases partial ponticulus posticus was found in 600 patients (60%) [Males 48 % & Females 52 %]. Complete variant was found in (8%) [Males 65% and females 35%] both in the age group of 19-48 years with the mean age of 28 years and SD 27.76 ± 10.74.

Conclusion: According to our study partial form of PP was found to be more prevalent as compared to complete form in Kashmiri population. Partial form was more frequently seen among females while as the ratio reversed for the complete variant.

Keywords: Lateral Cephalogram, Ponticulus Posticus (PP).

Introduction

The ponticulus posticus is defined as an abnormal small bony bridge formed between the posterior portion of the superior articular process and the posterolateral portion of the superior margin of the posterior arch of the atlas.[1] This bony bridge is known by different names, such as sagittal foramen, atlantal posterior foramen, arcuate foramen, a variant of Kimmerle's anomaly retroarticular canal and retrocondilar vertebral artery ring. However, its most accepted name is ponticulus posticus. [2,3]

Radiographically ponticulus posticus appear with many variations in features like thickness and configuration. The appearance of complete arcuate foramina is round and radiographically appears as a bony ring which can be unilateral or bilateral. It has been classified into three types;

1. Full type: it forms a complete bony ring
2. Incomplete type: some portions of the bony ring are defective
3. Calcified type: there is a linear or amorphous calcification.[2,4]

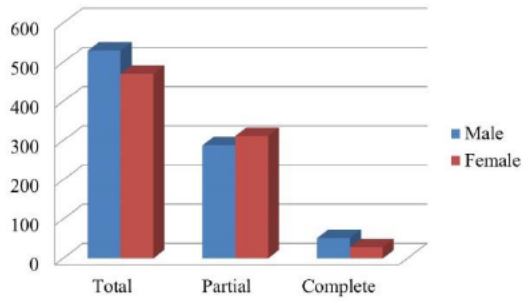
Its prevalence has been reported to be between 5.14% and 37.83% in the western population with no significant difference in genders. This condition became a matter of concern for spine surgeons because of its surgical significance in the insertion of screws into the lateral mass of the atlas. It has been recently reported that it could cause a severe complications during C1 lateral mass screws insertion. At times, it can be a possible cause of posterior circulation ischemia and cervicogenic headache.[1,5,6] The potential clinical significance of ponticulus posticus is that majority of patients with this are asymptomatic. However, symptoms that may be associated with ponticulus posticus include migraine, vertigo, diplopia, shoulder pain, neck pain which may be caused by the compression of vertebral artery as it passes from the foramen transversum of the Ist cervical vertebra to the foramen magnum of skull.[4,6,7] Thus the aim of the present study was to assess the prevalence of ponticulus posticus in Kashmiri population.

Materials & Methods

The sample of 1000 patients was selected in the age group of 10-70 years visiting the Department of Oral Medicine & Radiology Government Dental College & Hospital, Srinagar. Patients with congenital anomalies (cleft lip & palate, syndromes of craniofacial region and any history of trauma in cervical spine region) were excluded from the study. All the patients were subjected for digital lateral cephalogram. The images were viewed on a flat screen TFT-LCD monitor. Each radiograph was inspected for the presence and absence of PP and was further evaluated for both the partial and complete form.

Results

Out of 1000 cases, 530 [53%] were males and 470 [47%] were females. Among the study partial PP was found in 600 patients [60%] in which 312 [52%] were females and 288 [48%] were males. 80 patients 8% showed complete variant of ponticulus posticus and 320 [32%] showed neither type of PP. Complete variant was observed in 80 [8%] patients out of which 52 [65%] were males and 28 [35%] females. (Graph 1).



Graph 1: Multiple Bar Diagram presenting different forms of Ponticulus Posticus, Partial & Complete. (No of cases 1000)

Both variants were found in the age group of 19-48 years with the mean age 28 years and SD 27.76 ± 10.74. The mean age of males was 27.33 ± 11.37 and mean age of females was 28.22 ± 9.78. Z = 0.94 p > 0.05. There is no significant difference of age among males and females. This study found two types of bony rings i.e. Partial form [Figure 1] and complete form of ponticulus posticus [Figure 2].

Figure 1: - Partial type of ponticulus posticus which forms an incomplete bony ring

Figure 2: - Complete type of ponticulus posticus in which complete bony ring is seen

Discussions

Ponticulus posticus is an important anomaly of the atlas. It has surfaced after the use of lateral mass screws for the fixation of the atlas became common for the treatment of atlanto-axial instability. However, it can sometimes be difficult procedure to use lateral mass screws for the fixation of the atlas, as the region contains venous plexus as well as the greater occipital nerve. Which can result in an injury to the vertebral artery, and lead to stroke or even death by thrombosis, embolism, or arterial dissection.[1]

Studies have proposed that external mechanical factors, such as carrying heavy objects on head, could play a role in the development of these bony bridges. A previous study mentioned about the incidence of complete canal for vertebral artery in labourers to the non-labourers.[8] Paraskevas G also mentioned that there was higher occurrence of partial PP in the 5-44 years of age.[4] But in present study it was found that the higher incidence was in the age group of 19-48 years.

It has also been seen that the calcification of the bony bridge progresses over time has been described by Paraskevas G *et al*.[8]

In our study we found that complete foramen is significantly more common in males i.e. [65%] than females [35%] and partial foramen is common in females i.e. [52%] than males [48%] which show similarity to the results of Stubbs DM, 1992 in study of arcuate foramen, variability in distribution related to different race and sex.[9]

Taitz & Nathan studied 672 atlas vertebras, of which 25.9% had a partial posterior bridge and 7.9% a complete bony bridge. They found that partial bony bridges predominate in younger age groups (10 to 30 years) and complete bony bridges in the older age groups (30 to 80 years).[10] Which differs from our findings that in a way that both partial and complete bony bridges had a higher prevalence among the age groups of 16-45 years and we found only 10 cases of partial form in less than 15 years of age and 9 cases of partial form in the age group of 40-60 and none of the cases in this age group presented with complete form of PP.

Michell J in her study on lateral bridges of the atlas suggested that the foramen is lower in whites than in blacks.[11] However our study was conducted in Kashmiri population and was not compared with any other group of population and race has not been taken in consideration.

A study was carried out by Ephrosyni Koutsouraki *et al* to substantiate Kimmerle's anomaly as the possible cause of chronic tension-type headaches and neurosensory-type hearing loss. Investigations revealed that audiometric investigation concluded the hearing loss to be of the neurosensory type whereas, the imaging examinations revealed the existence of a partial osseous bridge, that is an incomplete arcuate foramen on the upper surface of atlas. Both the clinical and the radiological findings of this case were indicative of a possible connection between Kimmerle's anomaly and the manifestation of chronic tension-type headaches and neurosensory-type hearing loss.[12]

Conclusion

Within this sample, 68% showed some type of posticus ponticus. Future research should be conducted on other populations to create an awareness of the posticus ponticus as well as age, sex, and/or racial comparisons. Care must be taken to account for this type of anomaly on lateral cephalograms of orthodontic patients.

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